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Expected accuracy of a small telescope like PZT for observations of vertical gravity gradient and lunar rotation

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Abstract

© State Research Center of the Russian Federation Concern CSRI Elektropribor, JSC, 2016. Development of the PZT type telescope for observations of gravity gradient and lunar rotation was being made, and a Bread Board Model (BBM) for ground experiments was completed. Some developments were made for the BBM such as a new tripod and a stable mercury pool. We performed laboratory experiments and field observations from August to September of 2014, in order to check the total system of the telescope and the software. It is also investigated how the ground vibrations affect the stellar position on CCD. The results of the preliminary observations showed that the variation of stellar positions was better than 0.1 arc-second in the laboratory and was about 0.4 arc-seconds in the case of field observations. The difference in standard deviation (SD) of the variation is partly due to different signal to noise ratio (SNR) of star images. There was a strong correlation between the SD and SNR. There are, on the other hand, periodic components in the range lower than 6 Hz in a data from continuous record taken by a video camera. The variation became much smaller after removing the periodic components.

Keywords

Lunar rotation, Photographic Zenith Tube (PZT), Vertical gradient of gravity Deflection of the vertical